T	1886, April 5$\overset{d}{\cdot}$9520 Greenwich M.T.
ω	126° 34' 49"$\cdot$215
Ω	36 22 11$\cdot$454 Mean Equinox, 1886$\cdot$0
i	82 37 6$\cdot$012
e	1$\cdot$00047857
log a	3$\cdot$1278354
log q	9$\cdot$8077809

The two middle places are well represented.

The interval between the extreme observations is 181$\cdot$42 days, during which the comet described 208° 9' of its orbit.

Comet Barnard-Hartwig.   1886.

From the following observations the first and third of which were made at Washington, D.C., and the second at Kiel (*Astronomische Nachrichten*, 2753), an elliptic orbit of long period is obtained, the elements of which are given below :—

Greenwich M.T.	Appar. α.	Appar. δ.
1886, Oct. 7$\cdot$918987	10 42 9$\cdot$32	+ 1 22 6$\cdot$3
„ „ 29$\cdot$708660	11 39 22$\cdot$82	+ 5 49 19$\cdot$4
„ Dec. 2$\cdot$976975	15 32 3$\cdot$91	+17 58 55$\cdot$8

By means of approximate parabolic elements computed from a shorter interval, the corrections for aberration and parallax were obtained and applied.

T	1886, Dec. 16$\overset{d}{\cdot}$514158 Greenwich M.T.
ω	86° 21' 58"$\cdot$570
Ω	137 21 36$\cdot$163 Mean Equinox, 1886$\cdot$0
i	78 22 25$\cdot$525
e	0$\cdot$99872521
log a	2$\cdot$7162151
log q	9$\cdot$8216538

Motion retrograde. The middle place is exactly represented. These elements give a period of 11,866 years, which is of course very uncertain, since the interval between the extreme observations is far too short to determine this element accurately in an orbit such as this is.

The formulæ for the equatorial rectangular coordinates are—

$$x = [9\cdot8740086]\, r \sin(v + 6° 52' 45"\cdot171)$$
$$y = [9\cdot8268980]\, r \sin(v + 198\ 35\ 9\cdot651)$$
$$z = [9\cdot9977333]\, r \sin(v + 102\ 5\ 28\cdot657)$$

Ephemerides of the Satellites of Mars during the Oppositions of 1888 and 1890. By J. Morrison, M.D., M.A., Ph.D., Assistant on the American Ephemeris, and Professor of Chemistry, National University, Washington.

These ephemerides have been computed from the following elements of the orbits of the satellites, referred to the equator and equinox of the respective epochs :—

Phobos.

Epochs	1888, April 11·0	1890, May 27·0 Greenwich M.T.
Period	$0 \cdot 3189113$ (mean solar)	
μ	$1128 \cdot 8405$	
a	$12'' \cdot 953$ (at distance unity)	
i	$36^\circ\ 44' \cdot 6$	$36^\circ\ 44' \cdot 0$
N	$47\ 18 \cdot 2$	$47\ 19 \cdot 0$
u	$17\ 40$	$117\ 53 \cdot 6$

Deimos.

Epochs	1888, April 11·0	1890, May 27·0 Greenwich M.T.
Period	$1 \cdot 262435$ (mean solar)	
μ	$285^\circ \cdot 16322$	
a	$32'' \cdot 354$ (at distance unity)	
i	$35^\circ\ 36'$	$35^\circ\ 35' \cdot 5$
N	$48\ 10 \cdot 66$	$48\ 11 \cdot 5$
u	$225\ 41$	$172\ 21 \cdot 5$

Greenwich Mean Time of Greatest Elongation.

Phobos.

1888. d	G.M.T. h m	p °	a ''	b ''	1888. d	G.M.T. h m	p °	a ''	b ''
Mar. 21	7 53·5 W	306·4	19·1	6·1	Mar. 30	6 8·5 W			
22	10 40·4 E				31	8 55·3 E			
23	13 27·3 W				Apr. 1	11 42·1 W	305·8	20·5	6·8
24	16 14·2 E				2	14 29·0 E			
25	19 1·1 W				3	17 15·8 W			
26	21 48·0 E	126·2	19·6	6·4	4	20 2·6 E			
28	0 34·8 W				5	22 49·4 W			
29	3 21·7 E				7	1 36·1 E	125·3	21·0	7·3